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CLAIMS

[Claim(s)]

[Claim 1]A thin cell (1) which has stored a battery element (3) inside a film armor body (2).

A temperature protection element (8) which detects temperature of this thin cell (1), and a printed circuit board (7) which is fixing this temperature protection element (8).

Projected at the end that those with and pack battery showy and a thin cell (1) provided with the above were also at a film armor body (2), have provided a crevice (4), and this projection crevice (4), A base part (5) projected from one flat face (1A) of a thin cell (1), Consist of a partition part (6) projected from both side surfaces of a thin cell (1), and a printed circuit board (7) is allocated with a posture parallel to a base part (5) in this projection crevice (4), and a temperature protection element (8) is fixed to a field which counters this printed circuit board (7) with a base part (5).

[Claim 2]A thin cell (1) laminates a film armor body (2) of two sheets laminated to both sides of a battery element (3) on both sides of a battery element (3), An and pack battery indicated to claim 1 which has pasted up a laminating section, bends lamination jointing (2A) of a film armor body (2) along with a battery element (3), considers it as a partition part (6), makes this partition part (6) project from a battery element (3), projects, and is made into a partition part (6) of a crevice (4).

[Claim 3]An and pack battery indicated to claim 1 which is allocating an insulation sheet (10) between a temperature protection element (8) and a base part (5).

[Claim 4]An and pack battery with which a temperature protection element (8) is indicated to claim 1 which is PTC, a fuse, a thermo sensitive register, or a breaker.

[Claim 5]An and pack battery indicated to claim 1 which a temperature protection element (8) carries out reflow solder, and is being fixed to a printed circuit board (7).

[Claim 6]An and pack battery with which a thin cell (1) is indicated to claim 1 which is a lithium polymer secondary battery.

[Claim 7]An and pack battery with which a thin cell (1) is indicated to claim 1 which is a rechargeable lithium-ion battery.

[Claim 8]An and pack battery indicated to claim 1 which mounts a protection circuit (9) of a thin cell (1) in a printed circuit board (7).

[Claim 9]An and pack battery indicated to claim 8 which a protection circuit (9) equips with a circuit which prevents overcharge of a thin cell (1), overdischarge, or an over-current.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]About the and pack battery having the thin cell of a film armor body, especially, this invention detects the unusual rise in heat of a cell at the end of a thin cell, and relates to the and pack battery which contains the temperature protection element for protecting a cell from a surcharge or overdischarge.

[0002]

[Description of the Prior Art]The and pack battery having the thin cell of a film armor body makes the whole thin, and is made lightweight. The thin cell built in this and pack battery contains a battery element in a film armor body, and is manufactured. The battery element has provided the electrolyte layer between the anode and the negative electrode. The film armor body which seals a battery element laminates the film armor body which is a laminate film to both sides of a battery element, laminates it on the periphery of a battery element, carries out hot welding of the laminating section, and is made into airtight structure. A film armor body seals the battery element to build in thoroughly.

[0003]In order for the and pack battery having the thin cell of this structure to detect the unusual rise in heat of a thin cell and to protect a cell from a surcharge or overdischarge, it is necessary to make a temperature protection element build in. These people developed first the thin cell 1 and the and pack battery which contains the temperature protection element 8 with the structure shown in drawing 1. This and pack battery makes the film armor body 2 project at the end of the thin cell 1, projects, forms the crevice 4, and is allocating the printed circuit board 7 which mounts the protection circuit 9 here via the insulation sheet 10. PTC which is the temperature protection element 8 is allocated in the outside of the projection crevice 4. As shown in the sectional view of drawing 2, this and pack battery allocates the printed circuit board 7 inside the projection crevice 4, and is allocating the temperature protection element 8 in the outside of the projection crevice 4.

[0004]

[Problem(s) to be Solved by the Invention]Since the and pack battery of the above structure has arranged the printed circuit board 7 inside the projection crevice 4 of the film armor body 2 and arranges the temperature protection element 8 on the outside, the heat of the thin cell 1 does not conduct it to the temperature protection element 8 effectively. As the arrow of drawing 2 shows, the heat of the thin cell 1 radiates heat from both sides, and is conducted to the temperature protection element 8 via the projection crevice 4 of the film armor body 2. Although the temperature protection element 8 currently allocated here is making one side approach the projection crevice 4 of the film armor body 2, since other surfaces are made to express outside, the heat dissipation from this field is large, and the thermal conduction efficiency from the thin cell 1 worsens. For this reason, there was also a fault which cannot detect the unusual rise in heat of a thin cell by a temperature protection element promptly. Since it projected and the temperature protection

element had been arranged on the outside of a crevice, it became difficult for a temperature protection element to project in the state of storing to an and pack battery, and to make an outside into a flat. When the lobe of the film armor body was bent inside by force so that a temperature protection element might not project, there was evil as for which a bend part becomes is easy to damage.

[0005]since a temperature protection element is fixed apart from a printed circuit board, it fixes to a printed circuit board also in the state where time and effort takes and fixes also to arranging this in the regular position and fixing -- as -- it is certainly unfixable. When the fixed position of the temperature protection element shifted and having been separated from the film armor body, heat conduction from a thin cell worsened further, and there was a fault it becomes impossible to detect temperature correctly.

[0006]This invention is developed for the purpose of solving such a fault. The important purpose of this invention can arrange both a temperature protection element and a printed circuit board in an ideal position, and there is in improving heat conduction from a thin cell to a temperature protection element, and providing the and pack battery which can detect the temperature of a thin cell correctly promptly as it is also at a temperature protection element.

[0007]

[Means for Solving the Problem]An and pack battery of this invention is provided with the following. The thin cell 1 which has stored the battery element 3 inside the film armor body 2.

The temperature protection element 8 which prevents that detect temperature of this thin cell 1 and the thin cell 1 goes up to an unusual temperature.

The printed circuit board 7 which is fixing this temperature protection element 8.

It projected at the end that the thin cell 1 was also at the film armor body 2, and the crevice 4 is formed. This projection crevice 4 consists of the base part 5 projected from the one flat face 1A of the thin cell 1, and the partition part 6 projected from both side surfaces of the thin cell 1. The printed circuit board 7 is allocated with a posture parallel to the base part 5 in this projection crevice 4, and the temperature protection element 8 is fixed to a field which counters this printed circuit board 7 with the base part 5.

[0008]The thin cell 1 laminates the film armor body 2 of two sheets laminated to both sides of the battery element 3 on both sides of the battery element 3, and a laminating section is pasted up. The lamination jointing 2A of the film armor body 2 can be bent along with the battery element 3, it can be considered as the partition part 6, this partition part 6 can be made to be able to project from the battery element 3, and it can project, and can be considered as the partition part 6 of the crevice 4.

[0009]The insulation sheet 10 can be allocated between the temperature protection element 8 and the base part 5. The temperature protection element 8 can be used as PTC, a fuse, a thermo sensitive register, or a breaker. The reflow solder of the temperature protection element 8 is carried out, and it can be fixed to the printed circuit board 7. let the thin cell 1 be a lithium polymer secondary battery or a rechargeable lithium-ion battery -- things can be carried out. The protection circuit 9 of the thin cell 1 can be mounted in the printed circuit board 7. This protection circuit 9 can be provided with a circuit which prevents overcharge of the thin cell 1, overdischarge, or an over-current.

[0010]

[Embodiment of the Invention]Hereafter, the example of this invention is described based on a drawing. However, the example shown below illustrates the and pack battery for materializing the technical thought of this invention, and this invention does not specify an and pack battery as the following.

[0011]This specification has appended the number corresponding to the member shown in an example to the member shown in "the column of a claim", and "the column of The means for solving a technical problem" so that it may be easy to understand a claim. However, there is never nothing

what specifies the member shown in a claim as the member of an example.

[0012]The and pack battery shown in the sectional view of drawing 3 contains the printed circuit board 7 which is fixing the protection circuit 9 and the temperature protection element 8 of the thin cell 1 of the film armor body 2, and this thin cell 1 in Kay 12.

[0013]The thin cell 1 contains the battery element 3 in the film armor body 2. The battery element 3 had an anode, a negative electrode, and an electrolyte layer, and as shown in drawing 4, it has sealed this battery element 3 airtightly by the film armor body 2. The film armor body 2 of drawing 4 is turned up in the margo inferior of the battery element 3, is laminated by the both sides and upper bed of the battery element 3, pastes up a laminating section, and is making the battery element 3 build in an airtight chamber. The thin cell 1 of a figure has the lamination jointing 2A in the both sides and upper limb of the battery element 3, and has sealed the inside airtightly.

[0014]As the arrow A shows, the film armor body 2 which the thin cell 1 of drawing 5 made planate the film armor body 2 located in the bottom in a figure, and has been laminated to the battery element 3 up side, In accordance with the circumference of the battery element 3, it bends caudad, and laminates to the lower planate film armor body 2, a laminating section is pasted up, and it is considered as the lamination jointing 2A. The film armor body 2 is a laminate film, carried out hot welding of the laminating section, and is pasted up. A laminate film is a film which laminated the polypropylene film to both sides of aluminium foil so that an inside may be stuck airtightly and the hot welding of the laminating section can be carried out.

[0015]As shown in drawing 3 and drawing 6, the thin cell 1 projected at the end that it was also at the film armor body 2, and has formed the crevice 4. The projection crevice 4 of the film armor body 2 consists of the base part 5 projected from the one flat face 1A of the thin cell 1, and the partition part 6 considered as projection from the both side surfaces of the thin cell 1. The base part 5 and the partition part 6 of the projection crevice 4 are the lamination jointing 2A of the film armor body 2. In order to form the projection crevice 4 of this shape, as the arrow B of drawing 5 shows, the lamination jointing 2A located in the both sides of the battery element 3 is bent up along the side of the battery element 3 on both sides of the battery element 3, and is taken as the partition part 6. The partition part 6 is turned up inside on the upper bed edge, and makes the height almost equal to the thickness of the battery element 3. As shown in drawing 6, this partition part 6 is made to project from the end of the battery element 3, projects, and forms the partition part 6 of the crevice 4.

[0016]The printed circuit board 7 is allocated in the inside of the projection crevice 4. This printed circuit board 7 projects with a posture parallel to the base part 5, and is allocated in the crevice 4. This printed circuit board 7 is fixing the temperature protection element 8 to the base part 5 of the projection crevice 4, and the field which counters. The reflow solder of the temperature protection element 8 is carried out, and it is fixed to the printed circuit board 7. As the temperature protection element 8 which is here is allocated between the printed circuit board 7 and the base part 5 and the arrow of drawing 7 shows, it is heated from both the base part 5 of the projection crevice 4, and the end face of the battery element 3, and heat dissipation is prevented by the printed circuit board 7. For this reason, the heat of the battery element 3 can be told to the temperature protection element 8 very effectively.

[0017]The temperature protection element 8 is PTC. PTC is connected with the thin cell 1 in series. If the temperature of a cell becomes higher than preset temperature, electrical resistance will become high rapidly, and this PTC is made small to such an extent that the current which flows into a cell is intercepted substantially. However, a fuse, a thermo sensitive register, a breaker, etc. can be used for the temperature protection element 8. A fuse is also connected with a cell at series, and if battery temperature becomes higher than preset temperature, the current which flows into a cell will be intercepted. A thermo sensitive register detects the temperature of a cell as change of resistance, and if the temperature of a cell becomes higher than preset temperature, it will intercept the current of a cell as it is also in the protection circuit mounted in a printed circuit board. In the

case of a breaker, if the temperature of a cell becomes higher than preset temperature, the bimetal by which the inner package is carried out will be reversed, and the current which flows into a cell will be intercepted.

[0018]In addition to the temperature protection element 8, the printed circuit board 7 mounts the surcharge and overdischarge of the thin cell 1, and the protection circuit 9 which prevents an over-current in an opposed face with the base part 5. The circuit which prevents that an over-current flows through the protection circuit 9 when the circuit which prevents charge will operate, charge will be suspended if a cell becomes a full charge, the cell was discharged thoroughly, the circuit which prevents discharge operates, and discharge is suspended and an external terminal short-circuits operates.

[0019]The printed circuit board 7 is connected to the thin cell 1 via the lead board 13 made to project from the lamination jointing 2A of the thin cell 1. The lead 14 was connected to the printed circuit board 7, this lead 14 was pulled out to the exterior of the case 12 of an and pack battery, and the connector 15 is connected at a tip. Although not illustrated, the and pack battery can fix an output terminal to a printed circuit board, and can also be made to express outside from the contact window which provided this output terminal in the case.

[0020]The projection crevice 4 covers an inner surface with the insulation sheet 10, and is allocating the printed circuit board 7 on it. What covered with the insulation material the metallic foil the insulation sheet 10 excelled [metallic foil] in thermal conductivity is suitable. This insulation sheet 10 can conduct efficiently the heat of the base part 5 of the projection crevice 4 to the temperature protection element 8.

[0021]The and pack battery of drawing 6 allocated the printed circuit board 7 in the projection crevice 4, and it has adhered the fixing tape 11 so that the thin cell 1 and the printed circuit board 7 may be covered. The fixing tape 11 projects and certainly fixes the printed circuit board 7 to the regular position of the crevice 4. In this state, it puts into the case 12 and is assembled as an and pack battery.

[0022]The thin cell 1 stored by the case 12 is a lithium polymer secondary battery or a rechargeable lithium-ion battery. As for a lithium polymer secondary battery, a solid or the thing of ordinary temperature gel is used for an electrolyte. A lithium polymer secondary battery uses the following combination for an anode and a negative electrode.

Anode Manganic acid lithium Negative electrode Graphite system carbon Anode Vanadium oxide Negative electrode ---- Lithium alloy[0023]The electrolysis solution which serves as a solute of LiPF₆ grade from a solvent is used, and a rechargeable lithium-ion battery uses the following for an anode and a negative electrode.

An anode cobalt acid lithium A negative electrode graphite system carbon . An anode cobalt acid lithium A negative electrode coke system carbon An anode nickel acid lithium A negative electrode graphite system carbon An anode manganic acid lithium A negative electrode graphite system carbon An anode cobalt acid lithium A negative electrode tin AMO -- face -- oxide[0024]

[Effect of the Invention]The and pack battery of this invention can arrange both a temperature protection element and a printed circuit board in an ideal position, and it improves heat conduction from a thin cell to a temperature protection element, and there is the feature that the temperature of a thin cell is correctly detectable promptly in it being also at a temperature protection element. The base part in which it projects the projection crevice which the and pack battery of this invention established in the end by the film armor body of the thin cell from one flat face of a thin cell, Constitute from a partition part which projects from the both side surfaces of a thin cell, and a printed circuit board is allocated with a posture parallel to a base part in this projection crevice, and it is because the temperature protection element is fixed to the base part of this printed circuit board, and the field which counters. Since a temperature protection element is heated from both the base part of a projection crevice, and the end face of a battery element and heat dissipation is

prevented by a printed circuit board, the and pack battery of this structure conducts the heat of a battery element to a temperature protection element very effectively, and can detect the temperature of a thin cell correctly promptly by a temperature protection element.

[0025] Since the and pack battery of this invention projects and arranges a temperature protection element inside a crevice, both a temperature protection element and a printed circuit board can be arranged to space-saving, and there is the feature that the flat outside in which a thin temperature protection element does not project from the flat face of a thin cell is realized, and appearance can improve. The and pack battery with which a temperature protection element does not project outside from the flat face of a thin cell has the feature which can decrease the incidence rate of inferior goods ultimately, without damaging the lobe of a film armor body.

[0026] Since the and pack battery of this invention can arrange a temperature protection element in the regular position by projecting and arranging inside a crevice the printed circuit board which fixed the temperature protection element, A temperature protection element can be arranged to a position simply and correctly, and the time and effort concerning immobilization of a temperature protection element is decreased ultimately, and there is the feature which efficiency can improve high production.

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TECHNICAL FIELD

[Field of the Invention]About the and pack battery having the thin cell of a film armor body, especially, this invention detects the unusual rise in heat of a cell at the end of a thin cell, and relates to the and pack battery which contains the temperature protection element for protecting a cell from a surcharge or overdischarge.

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PRIOR ART

[Description of the Prior Art]The and pack battery having the thin cell of a film armor body makes the whole thin, and is made lightweight. The thin cell built in this and pack battery contains a battery element in a film armor body, and is manufactured. The battery element has provided the electrolyte layer between the anode and the negative electrode. The film armor body which seals a battery element laminates the film armor body which is a laminate film to both sides of a battery element, laminates it on the periphery of a battery element, carries out hot welding of the laminating section, and is made into airtight structure. A film armor body seals the battery element to build in thoroughly.

[0003]In order for the and pack battery having the thin cell of this structure to detect the unusual rise in heat of a thin cell and to protect a cell from a surcharge or overdischarge, it is necessary to make a temperature protection element build in. These people developed first the thin cell 1 and the and pack battery which contains the temperature protection element 8 with the structure shown in drawing 1. This and pack battery makes the film armor body 2 project at the end of the thin cell 1, projects, forms the crevice 4, and is allocating the printed circuit board 7 which mounts the protection circuit 9 here via the insulation sheet 10. PTC which is the temperature protection element 8 is allocated in the outside of the projection crevice 4. As shown in the sectional view of drawing 2, this and pack battery allocates the printed circuit board 7 inside the projection crevice 4, and is allocating the temperature protection element 8 in the outside of the projection crevice 4.

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EFFECT OF THE INVENTION

[Effect of the Invention]The and pack battery of this invention can arrange both a temperature protection element and a printed circuit board in an ideal position, and it improves heat conduction from a thin cell to a temperature protection element, and there is the feature that the temperature of a thin cell is correctly detectable promptly in it being also at a temperature protection element. The base part in which it projects the projection crevice which the and pack battery of this invention established in the end by the film armor body of the thin cell from one flat face of a thin cell, Constitute from a partition part which projects from the both side surfaces of a thin cell, and a printed circuit board is allocated with a posture parallel to a base part in this projection crevice, and it is because the temperature protection element is fixed to the base part of this printed circuit board, and the field which counters. Since a temperature protection element is heated from both the base part of a projection crevice, and the end face of a battery element and heat dissipation is prevented by a printed circuit board, the and pack battery of this structure conducts the heat of a battery element to a temperature protection element very effectively, and can detect the temperature of a thin cell correctly promptly by a temperature protection element.

[0025]Since the and pack battery of this invention projects and arranges a temperature protection element inside a crevice, both a temperature protection element and a printed circuit board can be arranged to space-saving, and there is the feature that the flat outside in which a thin temperature protection element does not project from the flat face of a thin cell is realized, and appearance can improve. The and pack battery with which a temperature protection element does not project outside from the flat face of a thin cell has the feature which can decrease the incidence rate of inferior goods ultimately, without damaging the lobe of a film armor body.

[0026]Since the and pack battery of this invention can arrange a temperature protection element in the regular position by projecting and arranging inside a crevice the printed circuit board which fixed the temperature protection element, A temperature protection element can be arranged to a position simply and correctly, and the time and effort concerning immobilization of a temperature protection element is decreased ultimately, and there is the feature which efficiency can improve high production.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]Since the and pack battery of the above structure has arranged the printed circuit board 7 inside the projection crevice 4 of the film armor body 2 and arranges the temperature protection element 8 on the outside, the heat of the thin cell 1 does not conduct it to the temperature protection element 8 effectively. As the arrow of drawing 2 shows, the heat of the thin cell 1 radiates heat from both sides, and is conducted to the temperature protection element 8 via the projection crevice 4 of the film armor body 2. Although the temperature protection element 8 currently allocated here is making one side approach the projection crevice 4 of the film armor body 2, since other surfaces are made to express outside, the heat dissipation from this field is large, and the thermal conduction efficiency from the thin cell 1 worsens. For this reason, there was also a fault which cannot detect the unusual rise in heat of a thin cell by a temperature protection element promptly. Since it projected and the temperature protection element had been arranged on the outside of a crevice, it became difficult for a temperature protection element to project in the state of storing to an and pack battery, and to make an outside into a flat. When the lobe of the film armor body was bent inside by force so that a temperature protection element might not project, there was evil as for which a bend part becomes is easy to damage.

[0005]since a temperature protection element is fixed apart from a printed circuit board, it fixes to a printed circuit board also in the state where time and effort takes and fixes also to arranging this in the regular position and fixing -- as -- it is certainly unfixable. When the fixed position of the temperature protection element shifted and having been separated from the film armor body, heat conduction from a thin cell worsened further, and there was a fault it becomes impossible to detect temperature correctly.

[0006]This invention is developed for the purpose of solving such a fault. The important purpose of this invention can arrange both a temperature protection element and a printed circuit board in an ideal position, and there is in improving heat conduction from a thin cell to a temperature protection element, and providing the and pack battery which can detect the temperature of a thin cell correctly promptly as it is also at a temperature protection element.

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MEANS

[Means for Solving the Problem]An and pack battery of this invention is provided with the following. The thin cell 1 which has stored the battery element 3 inside the film armor body 2.

The temperature protection element 8 which prevents that detect temperature of this thin cell 1 and the thin cell 1 goes up to an unusual temperature.

The printed circuit board 7 which is fixing this temperature protection element 8.

It projected at the end that the thin cell 1 was also at the film armor body 2, and the crevice 4 is formed. This projection crevice 4 consists of the base part 5 projected from the one flat face 1A of the thin cell 1, and the partition part 6 projected from both side surfaces of the thin cell 1. The printed circuit board 7 is allocated with a posture parallel to the base part 5 in this projection crevice 4, and the temperature protection element 8 is fixed to a field which counters this printed circuit board 7 with the base part 5.

[0008]The thin cell 1 laminates the film armor body 2 of two sheets laminated to both sides of the battery element 3 on both sides of the battery element 3, and a laminating section is pasted up, The lamination jointing 2A of the film armor body 2 can be bent along with the battery element 3, it can be considered as the partition part 6, this partition part 6 can be made to be able to project from the battery element 3, and it can project, and can be considered as the partition part 6 of the crevice 4.

[0009]The insulation sheet 10 can be allocated between the temperature protection element 8 and the base part 5. The temperature protection element 8 can be used as PTC, a fuse, a thermo sensitive register, or a breaker. The reflow solder of the temperature protection element 8 is carried out, and it can be fixed to the printed circuit board 7. let the thin cell 1 be a lithium polymer secondary battery or a rechargeable lithium-ion battery -- things can be carried out. The protection circuit 9 of the thin cell 1 can be mounted in the printed circuit board 7. This protection circuit 9 can be provided with a circuit which prevents overcharge of the thin cell 1, overdischarge, or an over-current.

[0010]

[Embodiment of the Invention]Hereafter, the example of this invention is described based on a drawing. However, the example shown below illustrates the and pack battery for materializing the technical thought of this invention, and this invention does not specify an and pack battery as the following.

[0011]This specification has appended the number corresponding to the member shown in an example to the member shown in "the column of a claim", and "the column of The means for solving a technical problem" so that it may be easy to understand a claim. However, there is never nothing what specifies the member shown in a claim as the member of an example.

[0012]The and pack battery shown in the sectional view of drawing 3 contains the printed circuit board 7 which is fixing the protection circuit 9 and the temperature protection element 8 of the thin cell 1 of the film armor body 2, and this thin cell 1 in Kay 12.

[0013]The thin cell 1 contains the battery element 3 in the film armor body 2. The battery element 3 had an anode, a negative electrode, and an electrolyte layer, and as shown in drawing 4, it has sealed this battery element 3 airtightly by the film armor body 2. The film armor body 2 of drawing 4 is turned up in the margin inferior of the battery element 3, is laminated by the both sides and upper bed of the battery element 3, pastes up a laminating section, and is making the battery element 3 build in an airtight chamber. The thin cell 1 of a figure has the lamination jointing 2A in the both sides and upper limb of the battery element 3, and has sealed the inside airtightly.

[0014]As the arrow A shows, the film armor body 2 which the thin cell 1 of drawing 5 made planate the film armor body 2 located in the bottom in a figure, and has been laminated to the battery element 3 up side. In accordance with the circumference of the battery element 3, it bends caudad, and laminates to the lower planate film armor body 2, a laminating section is pasted up, and it is considered as the lamination jointing 2A. The film armor body 2 is a laminate film, carried out hot welding of the laminating section, and is pasted up. A laminate film is a film which laminated the polypropylene film to both sides of aluminium foil so that an inside may be stuck airtightly and the hot welding of the laminating section can be carried out.

[0015]As shown in drawing 3 and drawing 6, the thin cell 1 projected at the end that it was also at the film armor body 2, and has formed the crevice 4. The projection crevice 4 of the film armor body 2 consists of the base part 5 projected from the one flat face 1A of the thin cell 1, and the partition part 6 considered as projection from the both side surfaces of the thin cell 1. The base part 5 and the partition part 6 of the projection crevice 4 are the lamination jointing 2A of the film armor body 2. In order to form the projection crevice 4 of this shape, as the arrow B of drawing 5 shows, the lamination jointing 2A located in the both sides of the battery element 3 is bent up along the side of the battery element 3 on both sides of the battery element 3, and is taken as the partition part 6. The partition part 6 is turned up inside on the upper bed edge, and makes the height almost equal to the thickness of the battery element 3. As shown in drawing 6, this partition part 6 is made to project from the end of the battery element 3, projects, and forms the partition part 6 of the crevice 4.

[0016]The printed circuit board 7 is allocated in the inside of the projection crevice 4. This printed circuit board 7 projects with a posture parallel to the base part 5, and is allocated in the crevice 4. This printed circuit board 7 is fixing the temperature protection element 8 to the base part 5 of the projection crevice 4, and the field which counters. The reflow solder of the temperature protection element 8 is carried out, and it is fixed to the printed circuit board 7. As the temperature protection element 8 which is here is allocated between the printed circuit board 7 and the base part 5 and the arrow of drawing 7 shows, it is heated from both the base part 5 of the projection crevice 4, and the end face of the battery element 3, and heat dissipation is prevented by the printed circuit board 7. For this reason, the heat of the battery element 3 can be told to the temperature protection element 8 very effectively.

[0017]The temperature protection element 8 is PTC. PTC is connected with the thin cell 1 in series. If the temperature of a cell becomes higher than preset temperature, electrical resistance will become high rapidly, and this PTC is made small to such an extent that the current which flows into a cell is intercepted substantially. However, a fuse, a thermo sensitive register, a breaker, etc. can be used for the temperature protection element 8. A fuse is also connected with a cell at series, and if battery temperature becomes higher than preset temperature, the current which flows into a cell will be intercepted. A thermo sensitive register detects the temperature of a cell as change of resistance, and if the temperature of a cell becomes higher than preset temperature, it will intercept the current of a cell as it is also in the protection circuit mounted in a printed circuit board. In the case of a breaker, if the temperature of a cell becomes higher than preset temperature, the bimetal by which the inner package is carried out will be reversed, and the current which flows into a cell will be intercepted.

[0018]In addition to the temperature protection element 8, the printed circuit board 7 mounts the

surcharge and overdischarge of the thin cell 1, and the protection circuit 9 which prevents an over-current in an opposed face with the base part 5. The circuit which prevents that an over-current flows through the protection circuit 9 when the circuit which prevents charge will operate, charge will be suspended if a cell becomes a full charge, the cell was discharged thoroughly, the circuit which prevents discharge operates, and discharge is suspended and an external terminal short-circuits operates.

[0019]The printed circuit board 7 is connected to the thin cell 1 via the lead board 13 made to project from the lamination jointing 2A of the thin cell 1. The lead 14 was connected to the printed circuit board 7, this lead 14 was pulled out to the exterior of the case 12 of an and pack battery, and the connector 15 is connected at a tip. Although not illustrated, the and pack battery can fix an output terminal to a printed circuit board, and can also be made to express outside from the contact window which provided this output terminal in the case.

[0020]The projection crevice 4 covers an inner surface with the insulation sheet 10, and is allocating the printed circuit board 7 on it. What covered with the insulation material the metallic foil the insulation sheet 10 excelled [metallic foil] in thermal conductivity is suitable. This insulation sheet 10 can conduct efficiently the heat of the base part 5 of the projection crevice 4 to the temperature protection element 8.

[0021]The and pack battery of drawing 6 allocated the printed circuit board 7 in the projection crevice 4, and it has adhered the fixing tape 11 so that the thin cell 1 and the printed circuit board 7 may be covered. The fixing tape 11 projects and certainly fixes the printed circuit board 7 to the regular position of the crevice 4. In this state, it puts into the case 12 and is assembled as an and pack battery.

[0022]The thin cell 1 stored by the case 12 is a lithium polymer secondary battery or a rechargeable lithium-ion battery. As for a lithium polymer secondary battery, a solid or the thing of ordinary temperature gel is used for an electrolyte. A lithium polymer secondary battery uses the following combination for an anode and a negative electrode.

Anode Manganic acid lithium Negative electrode Graphite system carbon Anode Vanadium oxide Negative electrode Lithium alloy[0023]The electrolysis solution which serves as a solute of LiPF₆ grade from a solvent is used, and a rechargeable lithium-ion battery uses the following for an anode and a negative electrode.

An anode cobalt acid lithium A negative electrode graphite system carbon . An anode cobalt acid lithium A negative electrode coke system carbon An anode nickel acid lithium A negative electrode graphite system carbon An anode manganic acid lithium A negative electrode graphite system carbon An anode cobalt acid lithium A negative electrode tin AMO -- face -- oxide

[Translation done.]

* NOTICES *

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- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The exploded perspective view of the and pack battery which these people developed previously

[Drawing 2]The sectional view of the and pack battery shown in drawing 1

[Drawing 3]The sectional view of the and pack battery of the example of this invention

[Drawing 4]The top view showing the manufacturing process of the thin cell built in the and pack battery shown in drawing 3

[Drawing 5]The sectional view showing the manufacturing process of the thin cell built in the and pack battery shown in drawing 3

[Drawing 6]The exploded perspective view of the and pack battery shown in drawing 3

[Drawing 7]The expanded sectional view of the and pack battery shown in drawing 3

[Description of Notations]

- 1 -- Thin cell 1A -- Flat face
- 2 -- Film armor body 2A -- Lamination jointing
- 3 -- Battery element
- 4 -- Projection crevice
- 5 -- Base part
- 6 -- Partition part
- 7 -- Printed circuit board
- 8 -- Temperature protection element
- 9 -- Protection circuit
- 10 -- Insulation sheet
- 11 -- Fixing tape
- 12 -- Case
- 13 -- Lead board
- 14 -- Lead
- 15 -- Connector

[Translation done.]

* NOTICES *

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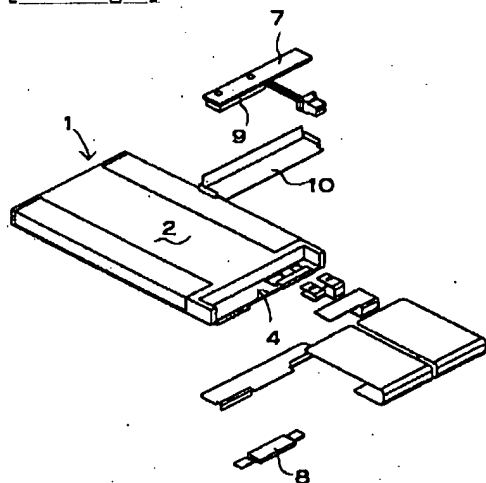
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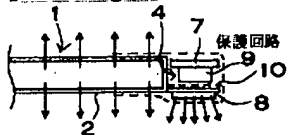
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DRAWINGS

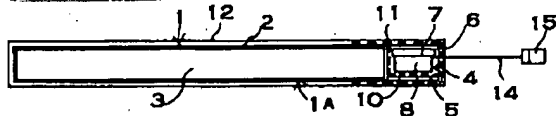
[Drawing 1]



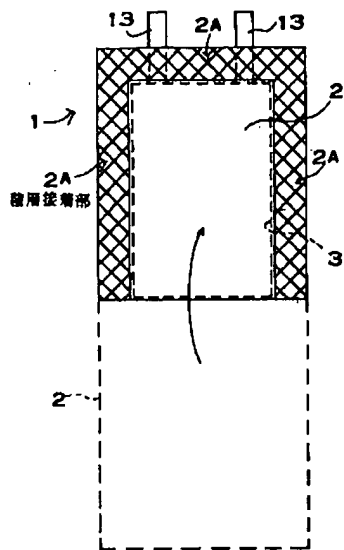
[Drawing 2]



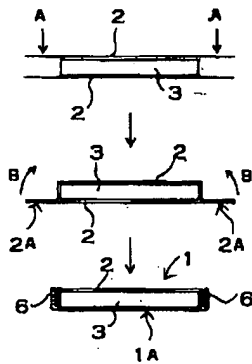
[Drawing 3]



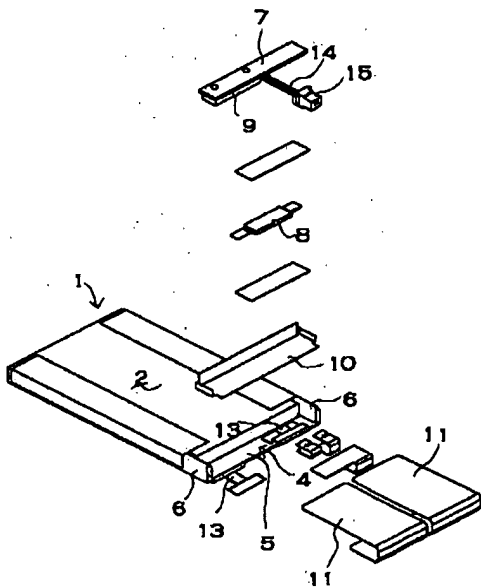
[Drawing 4]



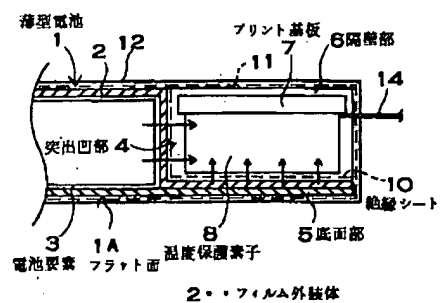
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

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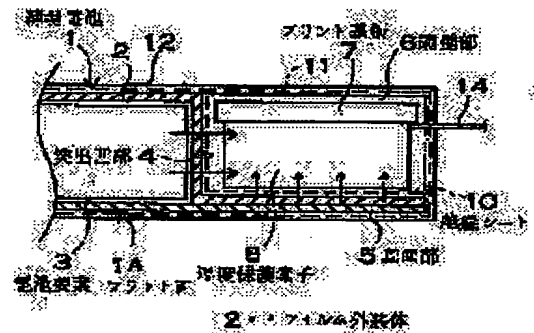
(72)Inventor : TERAOKA DAIKI

(54) PACKED BATTERY

(57)Abstract:

PROBLEM TO BE SOLVED: To dispose both of a temperature protecting element and a printed board at an ideal position, and a promptly and accurately detect the temperature of a thin battery by improving heat conduction, from the thin battery to the temperature protecting element.

SOLUTION: This packed battery comprises the thin battery 1 storing a battery element 3 in a film outer package 2, the temperature-protecting element 8 detecting the temperature of the thin battery 1 and preventing the thin battery from rising to abnormal temperature, and the printed board 7 fixing the temperature-protecting element 8. The thin battery 1 is provided with a projecting recessed portion 4 at an end portion by the film outer package 2. The projecting recessed portion 4 is composed of a bottom surface portion 5, projecting out from one flat surface 1A of the thin battery 1, and a partition 6 projecting out from both side surfaces of the thin battery 1. The printed board 7 is arranged, in parallel with the bottom surface portion 5 within the projecting recessed portion 4, and the temperature protecting element 8 is fixed on a surface opposite to the bottom surface portion 5 of the printed board 7.



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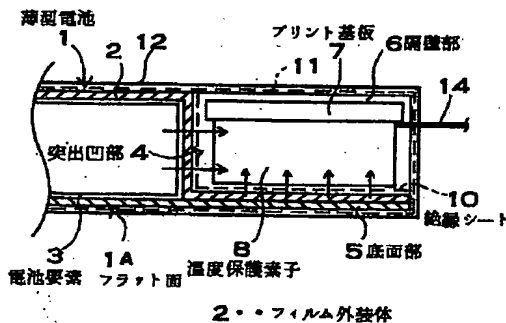
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(54) 【発明の名称】 バック電池

(57) 【要約】

【課題】 温度保護素子とプリント基板の両方を理想的な位置に配置する。薄型電池から温度保護素子への熱伝導を向上して、薄型電池の温度を速やかに正確に検出する。

【解決手段】 バック電池は、電池要素3をフィルム外装体2の内部に収納している薄型電池1と、この薄型電池1の温度を検出して薄型電池1が異常な温度に上昇するのを阻止する温度保護素子8と、この温度保護素子8を固定しているプリント基板7とを備える。薄型電池1は、フィルム外装体2でもって端部に突出凹部4を設けている。この突出凹部4は、薄型電池1のひとつのフラット面1Aから突出している底面部5と、薄型電池1の両側面から突出している隔壁部6からなる。この突出凹部4内に底面部5と平行な姿勢でプリント基板7を配設し、このプリント基板7の底面部5と対向する面に温度保護素子8を固定している。



【特許請求の範囲】

【請求項1】 電池要素(3)をフィルム外装体(2)の内部に収納している薄型電池(1)と、この薄型電池(1)の温度を検出する温度保護素子(8)と、この温度保護素子(8)を固定しているプリント基板(7)とを備えるバック電池であって、

薄型電池(1)がフィルム外装体(2)でもって端部に突出凹部(4)を設けており、この突出凹部(4)は、薄型電池(1)のひとつのフラット面(1A)から突出している底面部(5)と、薄型電池(1)の両側面から突出している隔壁部(6)からなり、この突出凹部(4)内に底面部(5)と平行な姿勢でプリント基板(7)を配設すると共に、このプリント基板(7)には底面部(5)と対向する面に温度保護素子(8)を固定していることを特徴とするバック電池は、

【請求項2】 薄型電池(1)が、電池要素(3)の両面に積層している2枚のフィルム外装体(2)を電池要素(3)の両側で積層して、積層部を接着しており、フィルム外装体(2)の積層接着部(2A)を電池要素(3)に沿って折曲して隔壁部(6)とし、この隔壁部(6)を電池要素(3)から突出させて突出凹部(4)の隔壁部(6)としている請求項1に記載されるバック電池。

【請求項3】 温度保護素子(8)と底面部(5)との間に絶縁シート(10)を配設している請求項1に記載されるバック電池。

【請求項4】 温度保護素子(8)が、PTC、ヒューズ、サーミスタ、ブレーカのいずれかである請求項1に記載されるバック電池。

【請求項5】 温度保護素子(8)が、リフロー半田してプリント基板(7)に固定されている請求項1に記載されるバック電池。

【請求項6】 薄型電池(1)がリチウムポリマー二次電池である請求項1に記載されるバック電池。

【請求項7】 薄型電池(1)がリチウムイオン二次電池である請求項1に記載されるバック電池。

【請求項8】 プリント基板(7)に薄型電池(1)の保護回路(9)を実装している請求項1に記載されるバック電池。

【請求項9】 保護回路(9)が薄型電池(1)の過充電、過放電、過電流のいずれかを防止する回路を備える請求項8に記載されるバック電池。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、フィルム外装体の薄型電池を内蔵するバック電池に関し、とくに、薄型電池の端部に、電池の異常な温度上昇を検出して、電池を過充電や過放電から保護するための温度保護素子を内蔵するバック電池に関する。

【0002】

【従来の技術】 フィルム外装体の薄型電池を内蔵するバック電池は、全体を薄くして軽量にできる。このバック

電池に内蔵される薄型電池は、フィルム外装体に電池要素を内蔵して製作される。電池要素は、正極と負極の間に電解質層を設けている。電池要素を密閉するフィルム外装体は、ラミネートフィルムであるフィルム外装体を電池要素の両面に積層し、電池要素の外周に積層して、積層部を熱溶着して密閉構造とされる。フィルム外装体は、内蔵する電池要素を完全に密閉する。

【0003】 この構造の薄型電池を内蔵するバック電池は、薄型電池の異常な温度上昇を検出して、電池を過充電や過放電から保護するために、温度保護素子を内蔵させる必要がある。本出願人等は、最初に、図1に示す構造で薄型電池1と温度保護素子8を内蔵するバック電池を開発した。このバック電池は、薄型電池1の端部にフィルム外装体2を突出させて突出凹部4を設け、ここに絶縁シート10を介して保護回路9を実装するプリント基板7を配設している。さらに、温度保護素子8であるPTCを、突出凹部4の外側に配設している。このバック電池は、図2の断面図に示すように、突出凹部4の内側にプリント基板7を配設して、突出凹部4の外側に温度保護素子8を配設している。

【0004】

【発明が解決しようとする課題】 以上の構造のバック電池は、フィルム外装体2の突出凹部4の内側にプリント基板7を配置して、その外側に温度保護素子8を配置しているので、薄型電池1の熱が有効に温度保護素子8に伝導されない。薄型電池1の熱は図2の矢印で示すように、両面から放熱され、フィルム外装体2の突出凹部4を介して温度保護素子8に伝導される。さらに、ここに配設している温度保護素子8は、片面をフィルム外装体2の突出凹部4に接近させているが、他の表面を外部に表出させているので、この面からの放熱が大きく、薄型電池1からの熱伝導効率が悪くなる。このため、薄型電池の異常な温度上昇を速やかに温度保護素子で検出できない欠点もあった。さらに、温度保護素子が突出凹部の外側に配置するので、バック電池に収納する状態で温度保護素子が突出して、外形をフラットにするのが難しくなった。温度保護素子が突出しないように、フィルム外装体の突出部を無理に内側に折曲すると、折曲部が損傷されやすくなる弊害もあった。

【0005】 さらに、温度保護素子をプリント基板とは別に固定するので、これを定位置に配置して固定するのにも手間がかかり、また固定する状態においても、プリント基板に固定するようには確実に固定できない。温度保護素子の固定位置がずれてフィルム外装体から離れると、さらに薄型電池からの熱伝導が悪くなって、温度を正確に検出できなくなる欠点があった。

【0006】 本発明は、このような欠点を解決することを目的に開発されたものである。本発明の重要な目的は、温度保護素子とプリント基板の両方を理想的な位置に配置できると共に、薄型電池から温度保護素子への熱

伝導を向上して、温度保護素子でもって薄型電池の温度を速やかに正確に検出できるバック電池を提供することにある。

【0007】

【課題を解決するための手段】本発明のバック電池は、電池要素3をフィルム外装体2の内部に収納している薄型電池1と、この薄型電池1の温度を検出して薄型電池1が異常な温度に上昇するのを阻止する温度保護素子8と、この温度保護素子8を固定しているプリント基板7とを備える。薄型電池1は、フィルム外装体2でもって端部に突出凹部4を設けている。この突出凹部4は、薄型電池1のひとつのフラット面1Aから突出している底面部5と、薄型電池1の両側面から突出している隔壁部6からなる。この突出凹部4内に底面部5と平行な姿勢でプリント基板7を配設すると共に、このプリント基板7には底面部5と対向する面に温度保護素子8を固定している。

【0008】薄型電池1は、電池要素3の両面に積層している2枚のフィルム外装体2を電池要素3の両側で積層して積層部を接着し、フィルム外装体2の積層接着部2Aを電池要素3に沿って折曲して隔壁部6とし、この隔壁部6を電池要素3から突出させて突出凹部4の隔壁部6とすることができる。

【0009】温度保護素子8と底面部5との間には、絶縁シート10を配設することができる。温度保護素子8は、PTC、ヒューズ、サーミスタ、ブレーカのいずれかとすることができる。温度保護素子8は、リフロー半田してプリント基板7に固定できる。薄型電池1は、リチウムポリマー二次電池、または、リチウムイオン二次電池とすることができる。プリント基板7には、薄型電池1の保護回路9を実装することができる。この保護回路9は、薄型電池1の過充電、過放電、過電流のいずれかを防止する回路を備えることができる。

【0010】

【発明の実施の形態】以下、本発明の実施例を図面に基づいて説明する。ただし、以下に示す実施例は、本発明の技術思想を具体化するためのバック電池を例示するものであって、本発明はバック電池を以下のものに特定しない。

【0011】さらに、この明細書は、特許請求の範囲を理解しやすいように、実施例に示される部材に対応する番号を、「特許請求の範囲の欄」、および「課題を解決するための手段の欄」に示される部材に付記している。ただ、特許請求の範囲に示される部材を、実施例の部材に特定するものでは決してない。

【0012】図3の断面図に示すバック電池は、フィルム外装体2の薄型電池1と、この薄型電池1の保護回路9及び温度保護素子8を固定しているプリント基板7をケーシング12に内蔵している。

【0013】薄型電池1は、フィルム外装体2に電池要素3

素3を内蔵している。電池要素3は、正極と負極と電解質層を有し、この電池要素3を、図4に示すように、フィルム外装体2で気密に密閉している。図4のフィルム外装体2は、電池要素3の下縁で折り返し、電池要素3の両側と上端で積層し、積層部を接着して、電池要素3を密閉チャンバーに内蔵させている。図の薄型電池1は、電池要素3の両側と上縁に積層接着部2Aがあって、内部を気密に密閉している。

【0014】図5の薄型電池1は、図において下側に位置するフィルム外装体2を平面状とし、電池要素3の上側に積層しているフィルム外装体2を、矢印Aで示すように、電池要素3の周囲に沿って下方に曲げて、下側の平面状のフィルム外装体2に積層し、積層部を接着して積層接着部2Aとしている。フィルム外装体2はラミネートフィルムで、積層部を熱溶着して接着している。ラミネートフィルムは、内部を気密に密着して積層部を熱溶着できるように、たとえば、アルミニウム箔の両面に、ポリプロピレンフィルムをラミネートしたフィルムである。

【0015】薄型電池1は、図3と図6に示すように、フィルム外装体2でもって端部に突出凹部4を設けている。フィルム外装体2の突出凹部4は、薄型電池1のひとつのフラット面1Aから突出している底面部5と、薄型電池1の両側面から突出している隔壁部6からなる。突出凹部4の底面部5と隔壁部6は、フィルム外装体2の積層接着部2Aである。この形状の突出凹部4を設けるために、電池要素3の両側に位置する積層接着部2Aは、図5の矢印Bで示すように、電池要素3の両側で電池要素3の側面に沿って上方に折り曲げて隔壁部6としている。隔壁部6は、上端縁で内側に折り返してその高さを電池要素3の厚さにはほぼ等しくしている。さらに、この隔壁部6は、図6に示すように、電池要素3の端部から突出させて突出凹部4の隔壁部6を形成している。

【0016】突出凹部4の内部には、プリント基板7を配設している。このプリント基板7は、底面部5と平行な姿勢で突出凹部4に配設される。さらに、このプリント基板7は、突出凹部4の底面部5と対向する面に温度保護素子8を固定している。温度保護素子8は、リフロー半田してプリント基板7に固定している。ここにある温度保護素子8は、プリント基板7と底面部5との間に配設されて、図7の矢印で示すように、突出凹部4の底面部5と電池要素3の端面の両方から加熱されて、プリント基板7で放熱が防止される。このため、電池要素3の熱を極めて有効に温度保護素子8に伝えることができる。

【0017】温度保護素子8はPTCである。PTCは、薄型電池1と直列に接続される。このPTCは、電池の温度が設定温度よりも高くなると電気抵抗が急激に高くなって、電池に流れる電流を実質的に遮断する程度

に小さくする。ただ、温度保護素子8には、ヒューズやサーミスタやブレーカ等も使用できる。ヒューズも電池と直列に接続されて、電池温度が設定温度よりも高くなると、電池に流れる電流を遮断する。サーミスタは、電池の温度を抵抗値の変化として検出し、電池の温度が設定温度よりも高くなると、プリント基板に実装している保護回路でもって電池の電流を遮断する。また、ブレーカの場合は、電池の温度が設定温度よりも高くなると、内装されているバイメタルが反転し、電池に流れる電流を遮断する。

【0018】プリント基板7は、底面部5との対向面に温度保護素子8に加えて、薄型電池1の過充電や過放電、また過電流を防止する保護回路9を実装している。保護回路9は、電池が満充電になると充電を阻止する回路が動作して充電を停止し、電池が完全に放電されると放電を阻止する回路が動作して放電を停止し、また、外部端子がショートしたときには、過電流が流れることを阻止する回路が動作するようになっている。

【0019】プリント基板7は、薄型電池1の積層接着部2Aから突出させているリード板13を介して薄型電池1に接続している。さらに、プリント基板7には、リード線14を接続しており、このリード線14をバック電池のケース12の外部に引き出して、先端にコネクタ*

正極……マンガン酸リチウム

正極……酸化バナジウム

【0023】リチウムイオン二次電池は、LiPF₆等の溶質と、溶媒からなる電解液が使用され、正極と負極※

正極……コバルト酸リチウム

正極……コバルト酸リチウム

正極……ニッケル酸リチウム

正極……マンガン酸リチウム

正極……コバルト酸リチウム

【0024】

【発明の効果】本発明のバック電池は、温度保護素子とプリント基板の両方を理想的な位置に配置できると共に、薄型電池から温度保護素子への熱伝導を向上して、温度保護素子でもって薄型電池の温度を速やかに正確に検出できる特長がある。それは、本発明のバック電池が、薄型電池のフィルム外装体で端部に設けた突出凹部を、薄型電池のひとつのフラット面から突出する底面部と、薄型電池の両側面から突出する隔壁部で構成し、この突出凹部内に底面部と平行な姿勢でプリント基板を配設すると共に、このプリント基板の底面部と対向する面に温度保護素子を固定しているからである。この構造のバック電池は、温度保護素子が、突出凹部の底面部と電池要素の端面の両方から加熱されると共に、プリント基板で放熱が防止されるので、電池要素の熱を極めて有効に温度保護素子に伝えて、薄型電池の温度を温度保護素子で速やかに正確に検出できる。

【0025】さらに、本発明のバック電池は、温度保護

*-15を連結している。図示しないが、バック電池は、プリント基板に出力端子を固定して、この出力端子をケースに設けた電極窓から外部に表出させることもできる。

【0020】突出凹部4は、内面に絶縁シート10を敷いて、その上にプリント基板7を配設している。絶縁シート10は、熱伝導性に優れた金属箔を絶縁材で被覆したものが適している。この絶縁シート10は、突出凹部4の底面部5の熱を効率よく温度保護素子8に伝えることができる。

【0021】図6のバック電池は、突出凹部4にプリント基板7を配設し、薄型電池1とプリント基板7をカバーするように固定テープ11を付着している。固定テープ11は、プリント基板7を突出凹部4の定位置に確実に固定する。この状態でケース12に入れてバック電池として組み立てられる。

【0022】ケース12に収納される薄型電池1は、リチウムポリマー二次電池、または、リチウムイオン二次電池である。リチウムポリマー二次電池は、電解質に固体、または常温ゲル状のものが使用される。リチウムポリマー二次電池は、正極と負極に以下の組合せを使用する。

負極……グラファイト系炭素

負極……リチウム合金

※に以下のものを使用する。

負極……グラファイト系炭素

負極……コークス系炭素

負極……グラファイト系炭素

負極……グラファイト系炭素

負極……錫アモーフス酸化物

素子を突出凹部の内側に配置するので、温度保護素子とプリント基板の両方を省スペースに配置できると共に、薄型電池のフラット面から薄温度保護素子が突出しないフラットな外形を実現して外觀を良くできる特長がある。温度保護素子が薄型電池のフラット面から外側に突出しないバック電池は、フィルム外装体の突出部を損傷することなく、不良品の発生率を極減できる特長もある。

【0026】さらに、本発明のバック電池は、温度保護素子を固定したプリント基板を突出凹部の内側に配置することによって、温度保護素子を定位置に配置できるので、簡単かつ正確に温度保護素子を所定の位置に配置できると共に、温度保護素子の固定にかかる手間を極減して、能率よく多量生産できる特長もある。

【図面の簡単な説明】

【図1】本出願人等が先に開発したバック電池の分解斜視図

【図2】図1に示すバック電池の断面図

【図3】本発明の実施例のバック電池の断面図

【図4】図3に示すバック電池に内蔵される薄型電池の製造工程を示す平面図

【図5】図3に示すバック電池に内蔵される薄型電池の製造工程を示す断面図

【図6】図3に示すバック電池の分解斜視図

【図7】図3に示すバック電池の拡大断面図

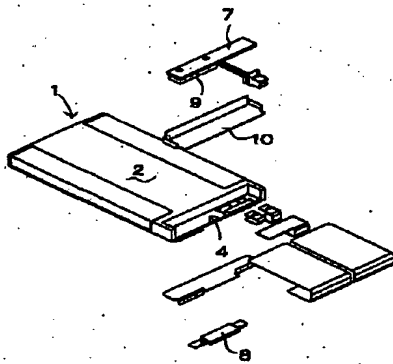
【符号の説明】

- 1…薄型電池 1A…フラット面
2…フィルム外装体 2A…積層接着部
3…電池要素
4…突出凹部

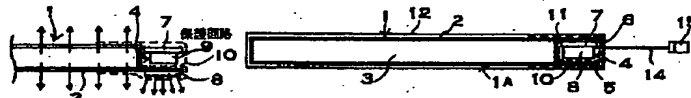
- * 5…底面部
6…隔壁部
7…プリント基板
8…温度保護素子
9…保護回路
10…絶縁シート
11…固定テープ
12…ケース
13…リード板
14…リード線
15…コネクタ

*

【図1】

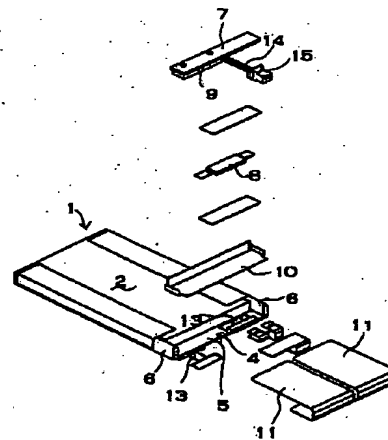


【図2】

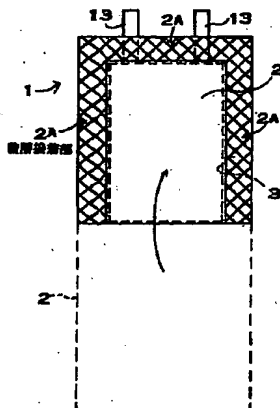


【図3】

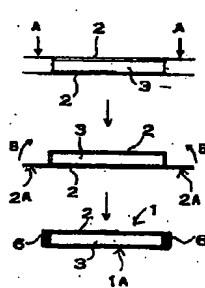
【図6】



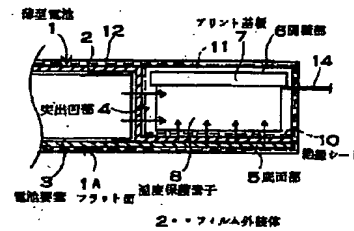
【図4】



【図5】



【図7】



フロントページの続き

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 DD26